



US011716512B2

(12) **United States Patent**
Brehm et al.

(10) **Patent No.: US 11,716,512 B2**
(45) **Date of Patent: Aug. 1, 2023**

(54) **PERSONALIZED MEDIA GUIDE FOR OFFLINE MEDIA DEVICES**

USPC 725/39
See application file for complete search history.

(71) Applicant: **Rovi Guides, Inc.**, San Jose, CA (US)

(56) **References Cited**

(72) Inventors: **Michael James Brehm**, Allen, TX (US); **Benjamin Harden**, Coronado, CA (US)

U.S. PATENT DOCUMENTS

(73) Assignee: **Rovi Guides, Inc.**, San Jose, CA (US)

7,370,343 B1 5/2008 Ellis
9,819,978 B2 * 11/2017 Park H04N 21/44209
2002/0194601 A1 12/2002 Perkes et al.
2005/0015713 A1 1/2005 Plastina et al.
2008/0141304 A1 6/2008 Otsu et al.

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(Continued)

FOREIGN PATENT DOCUMENTS

(21) Appl. No.: **17/464,846**

EP 3100267 B1 * 7/2020 H04L 65/1059
WO WO-2009035466 A1 * 3/2009 H04N 21/4345

(22) Filed: **Sep. 2, 2021**

OTHER PUBLICATIONS

(65) **Prior Publication Data**

US 2021/0400346 A1 Dec. 23, 2021

D. Grbic, et al., "Hybrid electronic program guide application for digital TV receiver," 2017 IEEE 7th International Conference on Consumer Electronics—Berlin (ICCE-Berlin), 2017, pp. 177-180.

Related U.S. Application Data

(63) Continuation of application No. 16/399,753, filed on Apr. 30, 2019, now Pat. No. 11,140,447.

Primary Examiner — Cynthia M Fogg

(74) *Attorney, Agent, or Firm* — Haley Guiliano LLP

(51) **Int. Cl.**

H04N 21/462 (2011.01)
H04N 21/422 (2011.01)
H04N 21/458 (2011.01)
H04N 21/45 (2011.01)
H04N 21/442 (2011.01)

(57) **ABSTRACT**

Systems and methods are described for displaying a guide for media content available on a user device. An illustrative method includes retrieving media content guide data for a plurality of channels, identifying a first media content item that is not available for retrieval from a content source, in response to identifying the first media content item, identifying a second media content item that is related to the first media content item and is available for retrieval from the content source, retrieving, from the content source, the second media content item, and generating for display a media content guide interface for the plurality of channels, wherein an identifier of the second media content item is displayed in a timeslot for the first media content item.

(52) **U.S. Cl.**

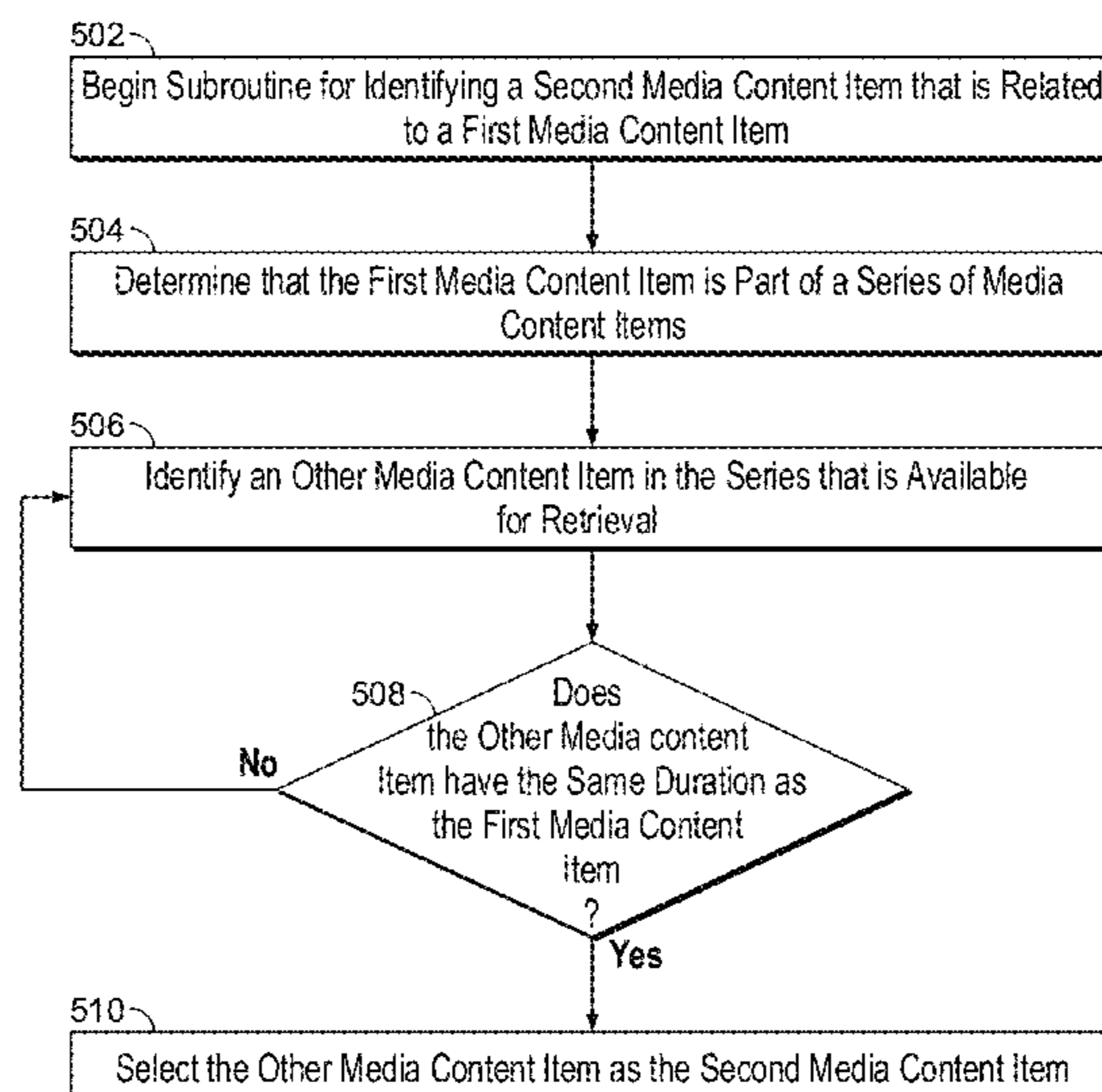
CPC **H04N 21/462** (2013.01); **H04N 21/42209** (2013.01); **H04N 21/44213** (2013.01); **H04N 21/458** (2013.01); **H04N 21/4532** (2013.01)

(58) **Field of Classification Search**

CPC H04N 21/462; H04N 21/42209; H04N 21/44213; H04N 21/4532; H04N 21/458; H04N 21/41407; H04N 21/4821; H04N 21/231; H04N 21/23424; H04N 21/21815

20 Claims, 7 Drawing Sheets

500



(56)

References Cited

U.S. PATENT DOCUMENTS

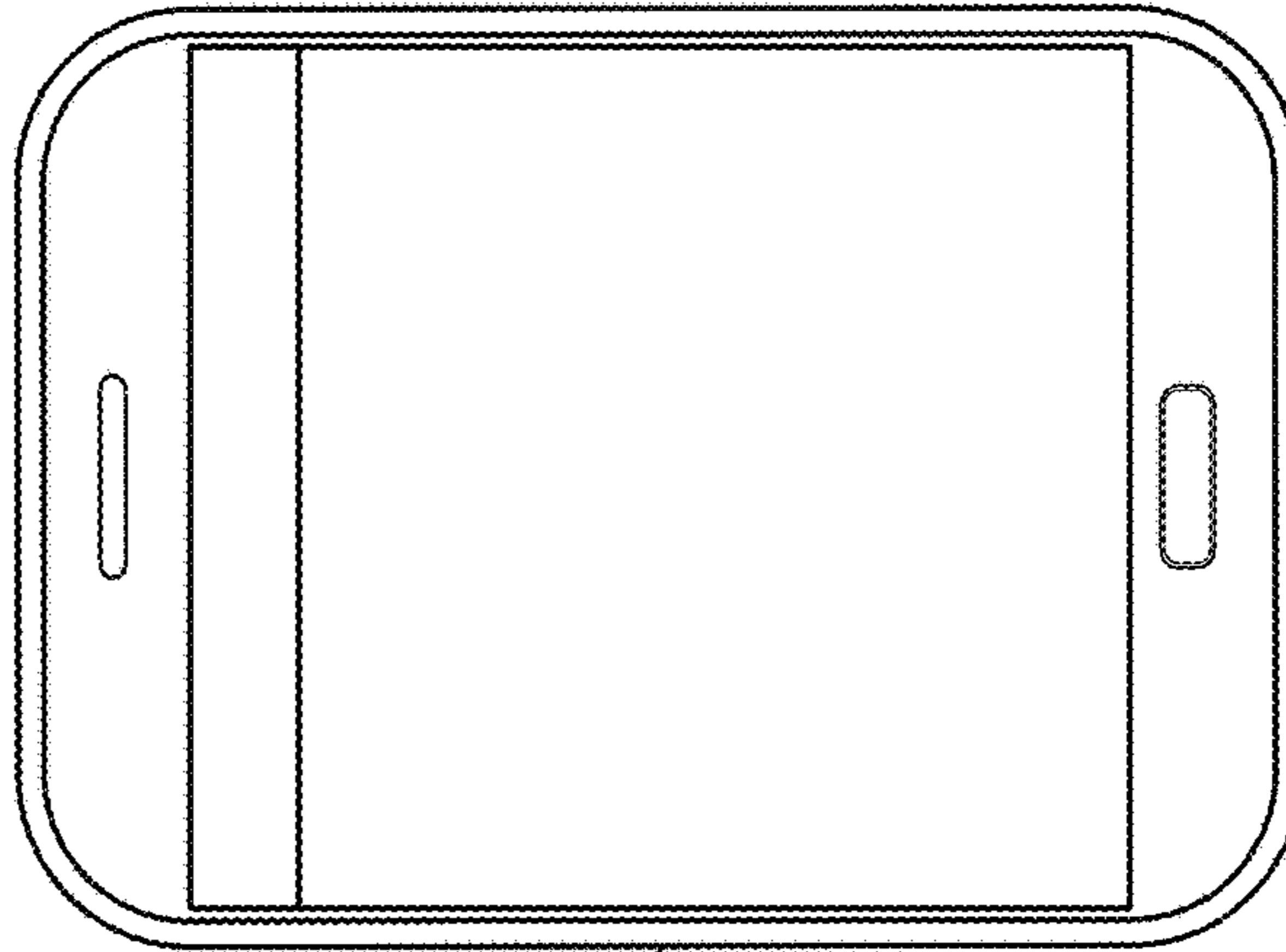
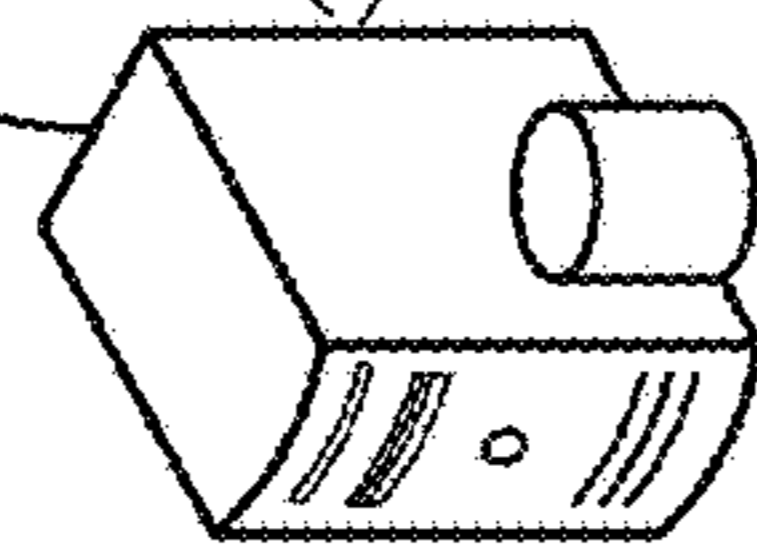
2008/0168066 A1 7/2008 Ruiz-Velasco et al.
2008/0271078 A1* 10/2008 Gossweiler H04N 21/47
725/40
2010/0146077 A1* 6/2010 Davies G06F 16/78
709/219
2011/0030010 A1* 2/2011 Overbaugh H04N 21/4821
725/151
2011/0301963 A1 12/2011 Diab et al.
2014/0156791 A1* 6/2014 Sant H04N 21/4181
709/217
2015/0237389 A1 8/2015 Grouf et al.
2015/0264323 A1* 9/2015 Pattison H04N 21/44209
725/40
2015/0341698 A1* 11/2015 Tian H04N 21/4622
725/45
2016/0165307 A1 6/2016 Lavender et al.
2017/0118064 A1 4/2017 Medina et al.
2017/0201571 A1 7/2017 Sherf et al.
2018/0196880 A1* 7/2018 Carter G06F 16/9537
2018/0227638 A1 8/2018 Jain et al.
2019/0132630 A1* 5/2019 Loheide H04N 21/23439
2019/0349619 A1* 11/2019 Hou H04N 21/4722
2019/0377955 A1* 12/2019 Swaminathan G06V 10/454

* cited by examiner

100

Friday 2/23	3:00pm	3:30pm	4:00pm
Channel 1	The Office	The Office	The Office
Channel 2	Law & Order	Aquaman	
Channel 3	Jack Ryan: Shadow Recruit	X-Men	
Channel 4	School of Rock		

The Office S03E02
The Office S03E03
The Office S03E04
Law & Order S08E19
Jack Ryan: Shadow...
Justice League
X-Men
School of Rock



Friday 2/23	3:00pm	3:30pm	4:00pm
Channel 1	The Office	The Office	The Office
Channel 2	Law & Order	Justice League	
Channel 3	Jack Ryan: Shadow Recruit	X-Men	
Channel 4	School of Rock		

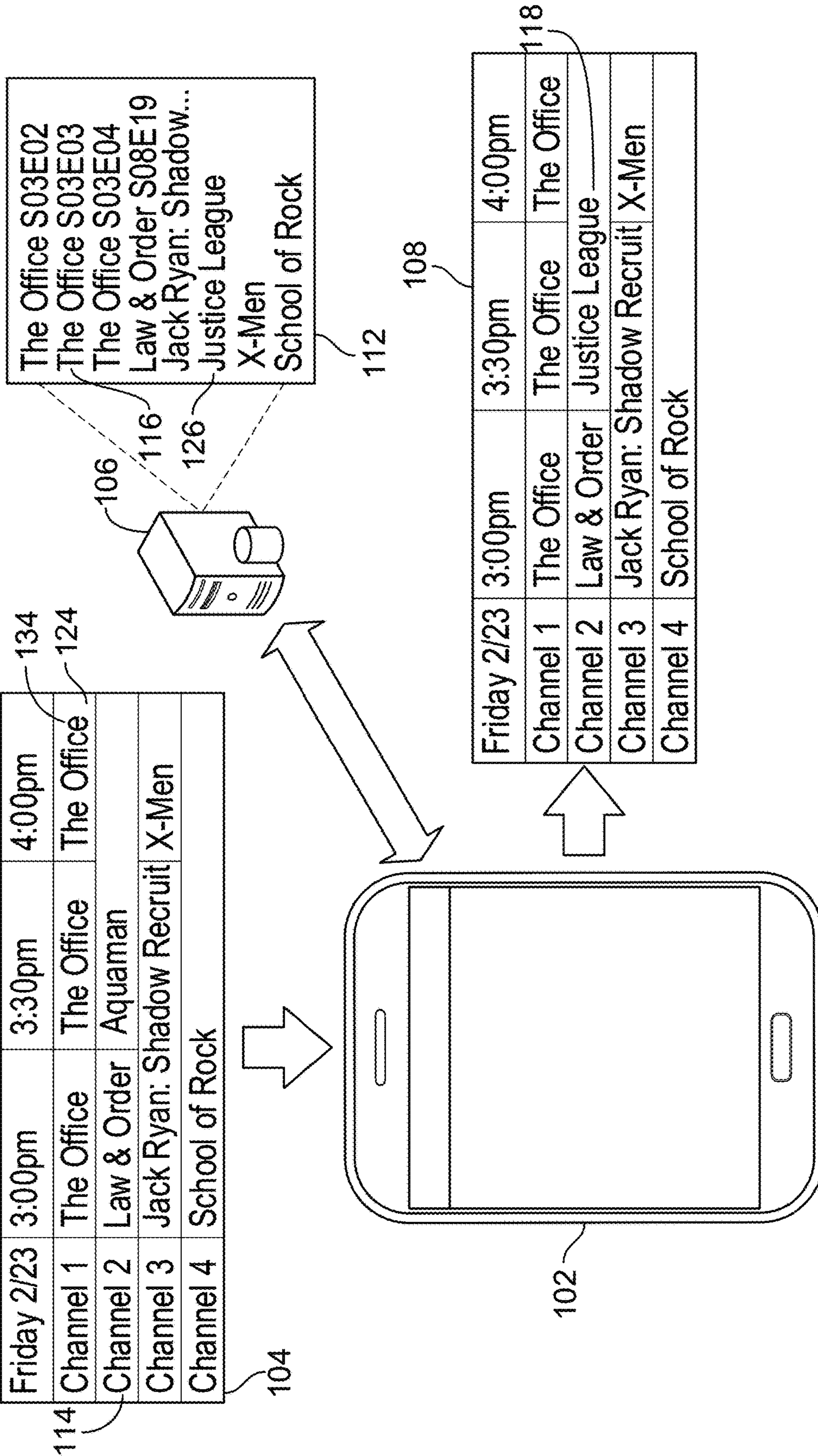


FIG. 1

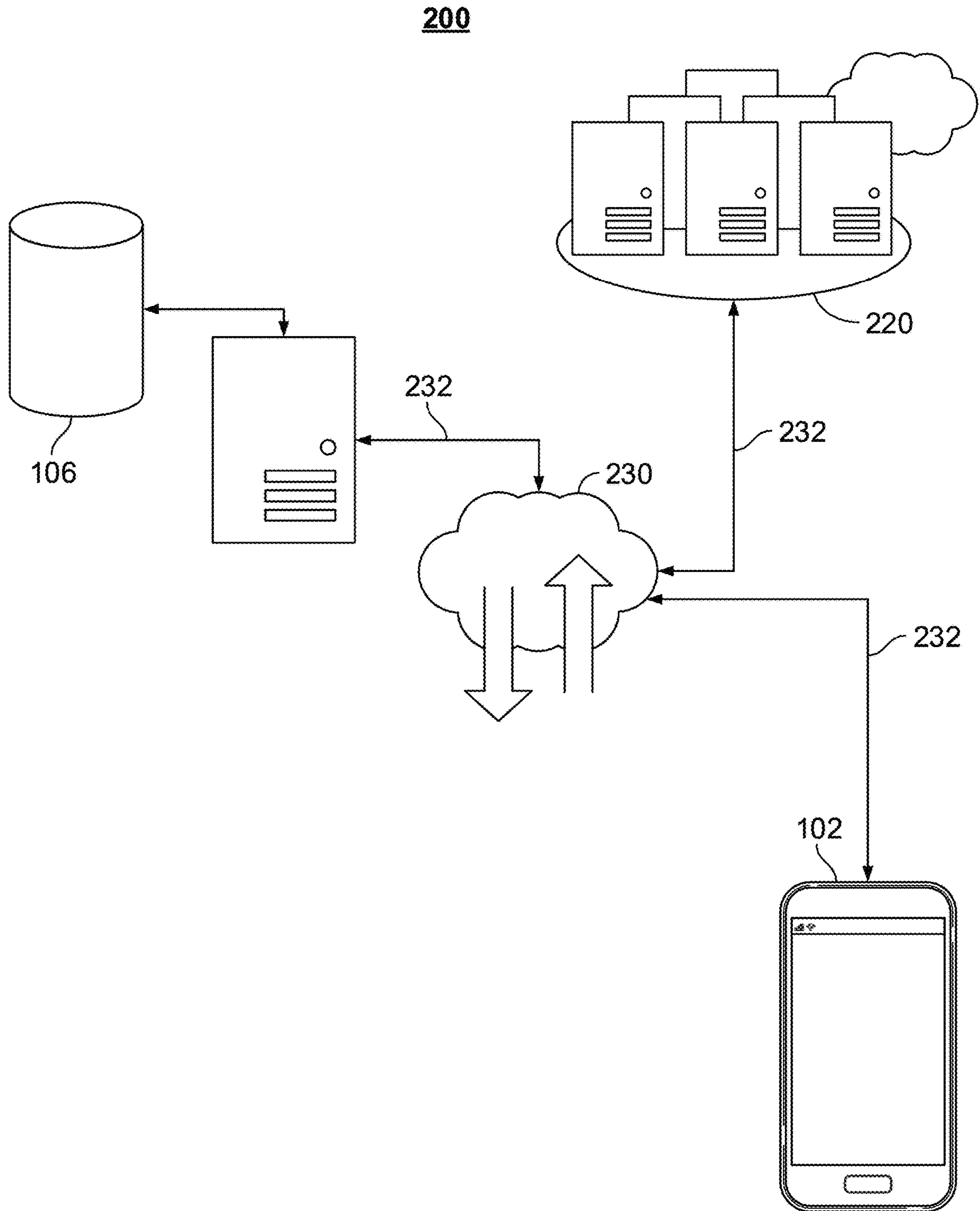


FIG. 2

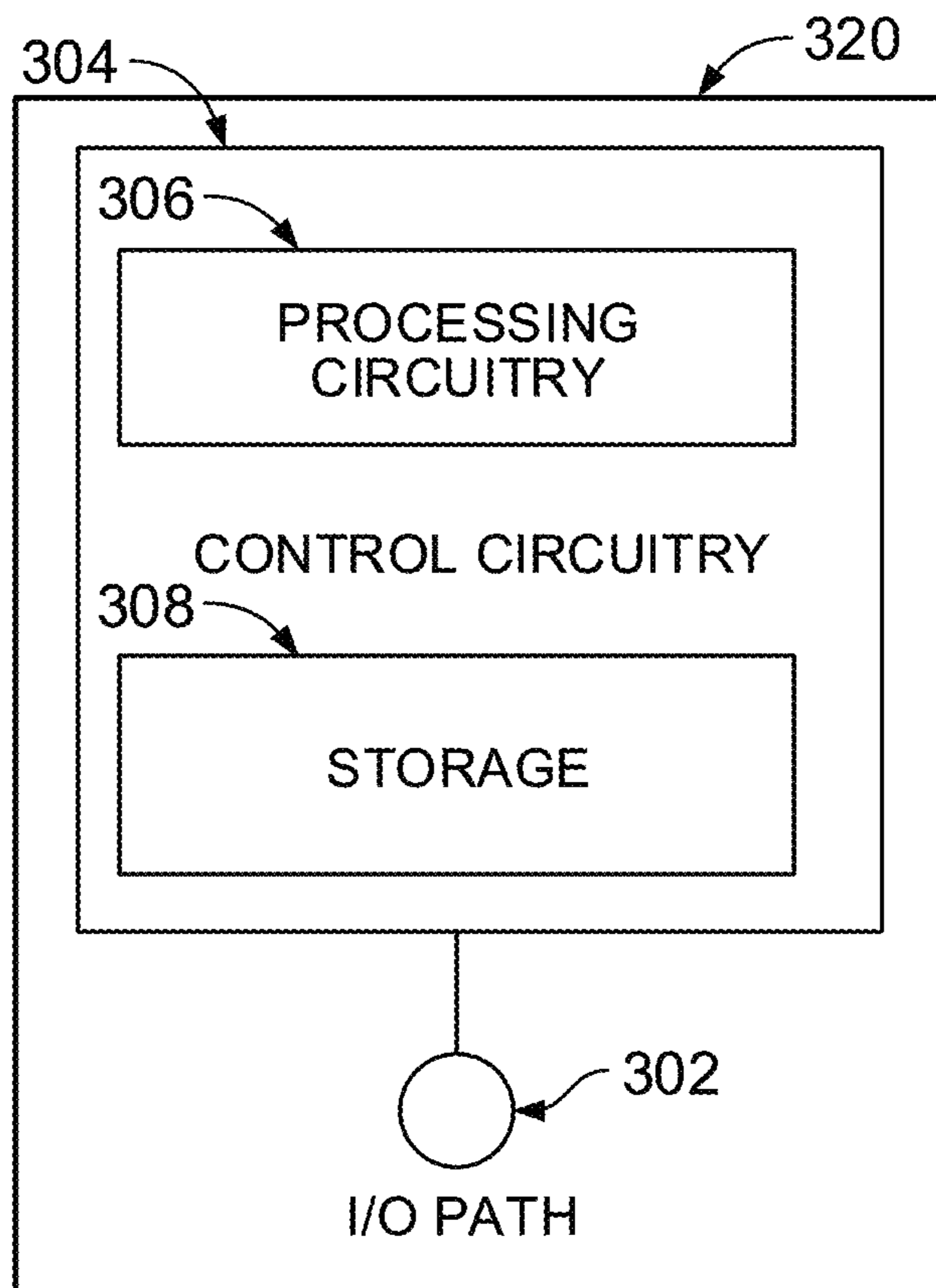
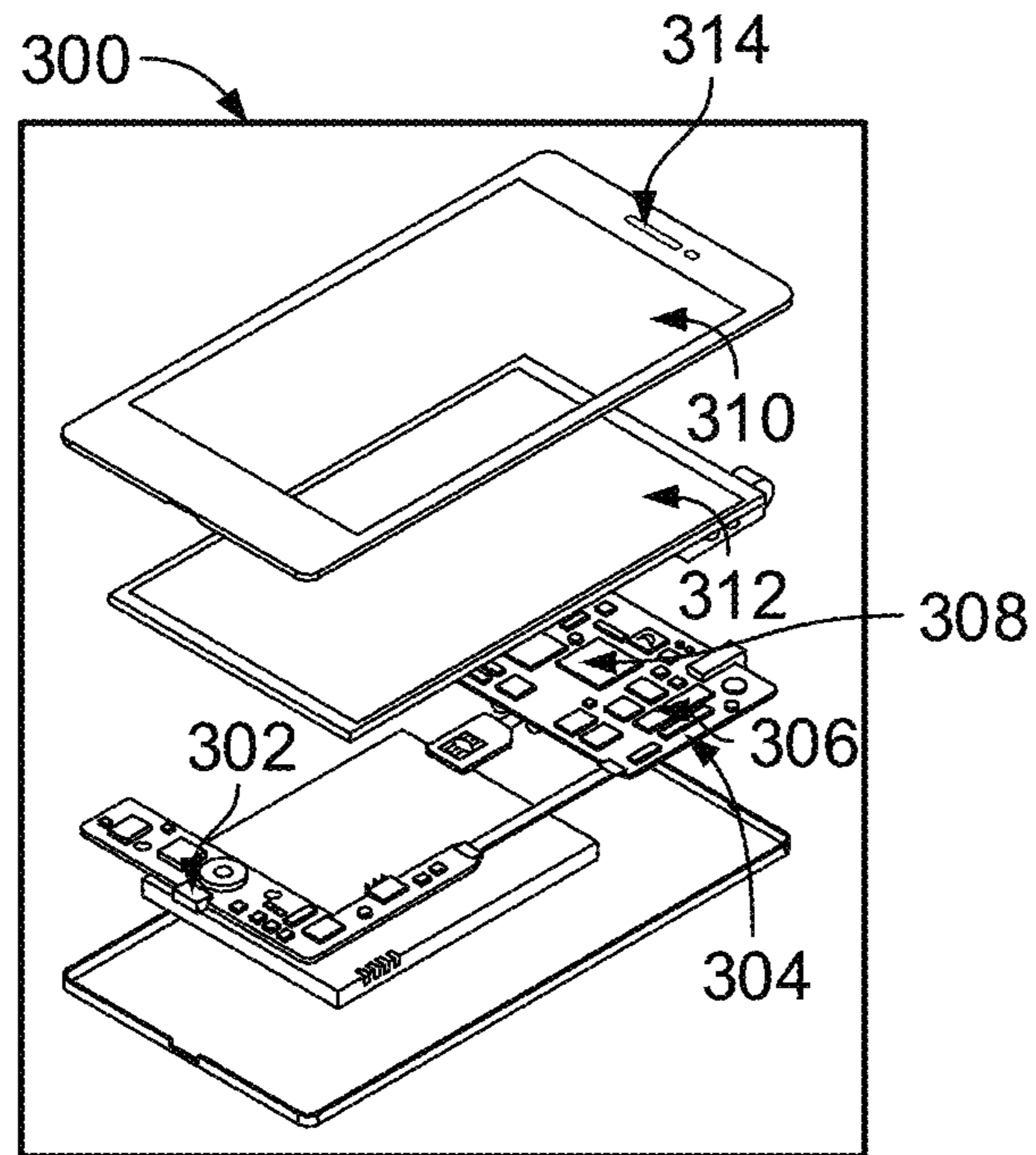


FIG. 3

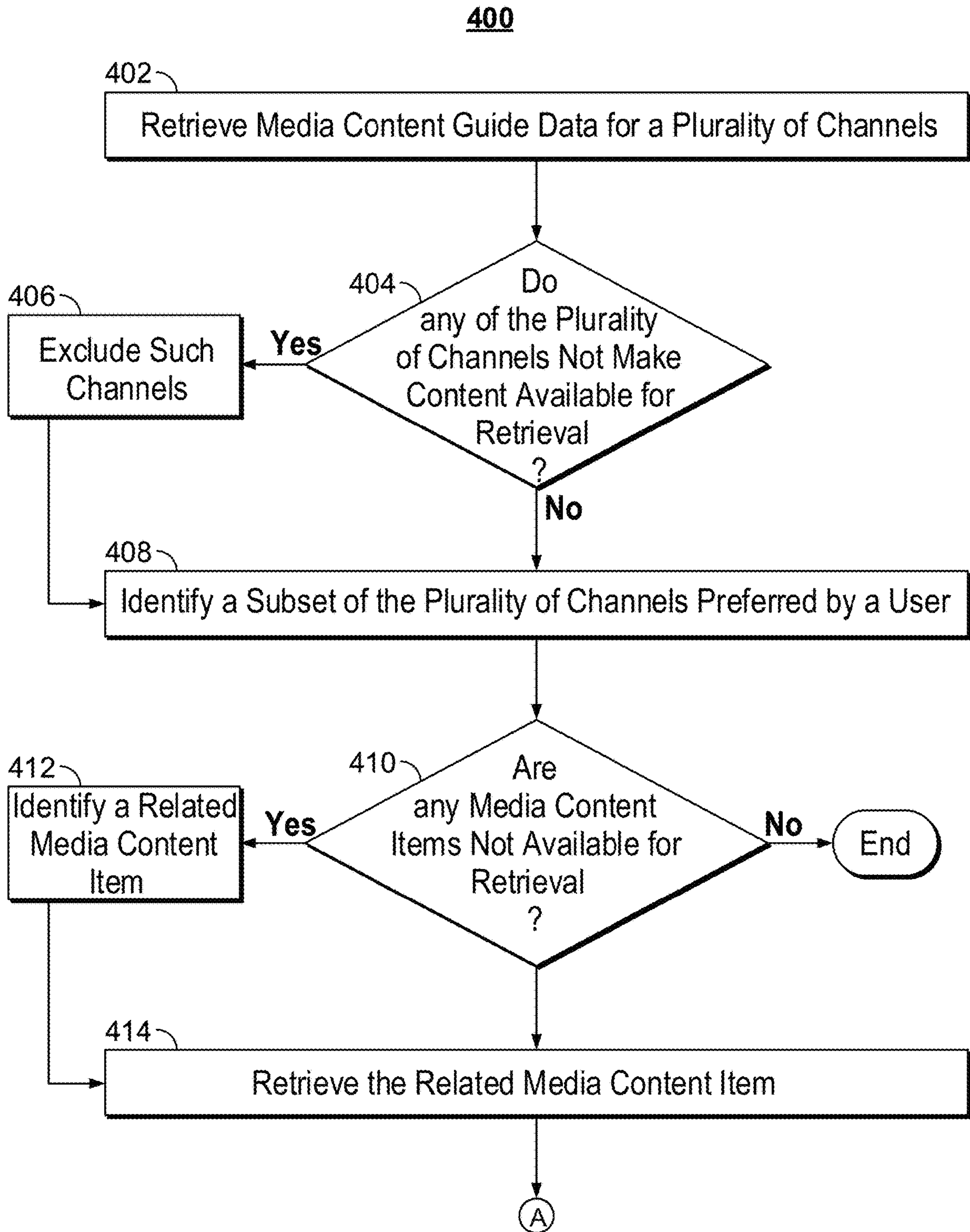


FIG. 4A

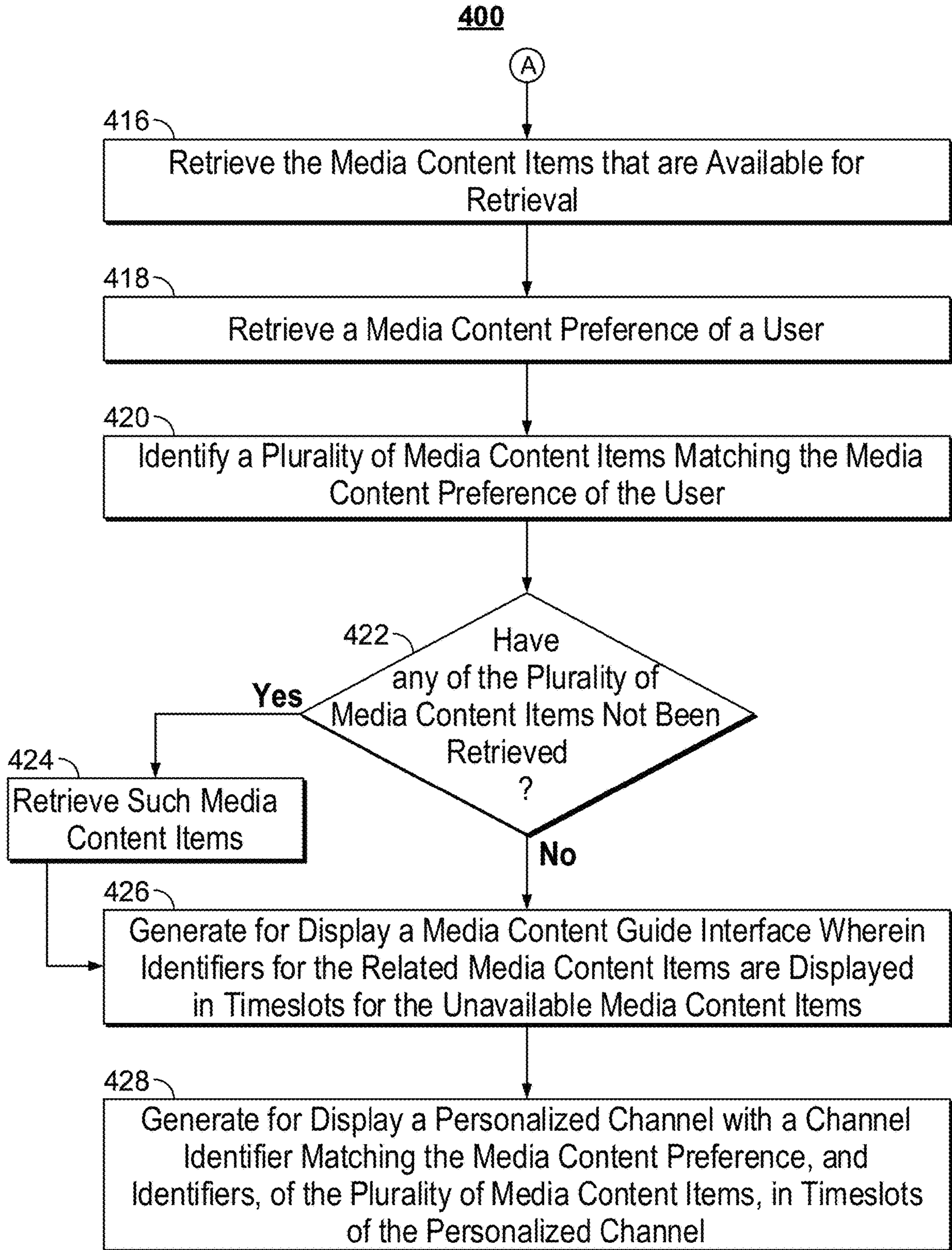


FIG. 4B

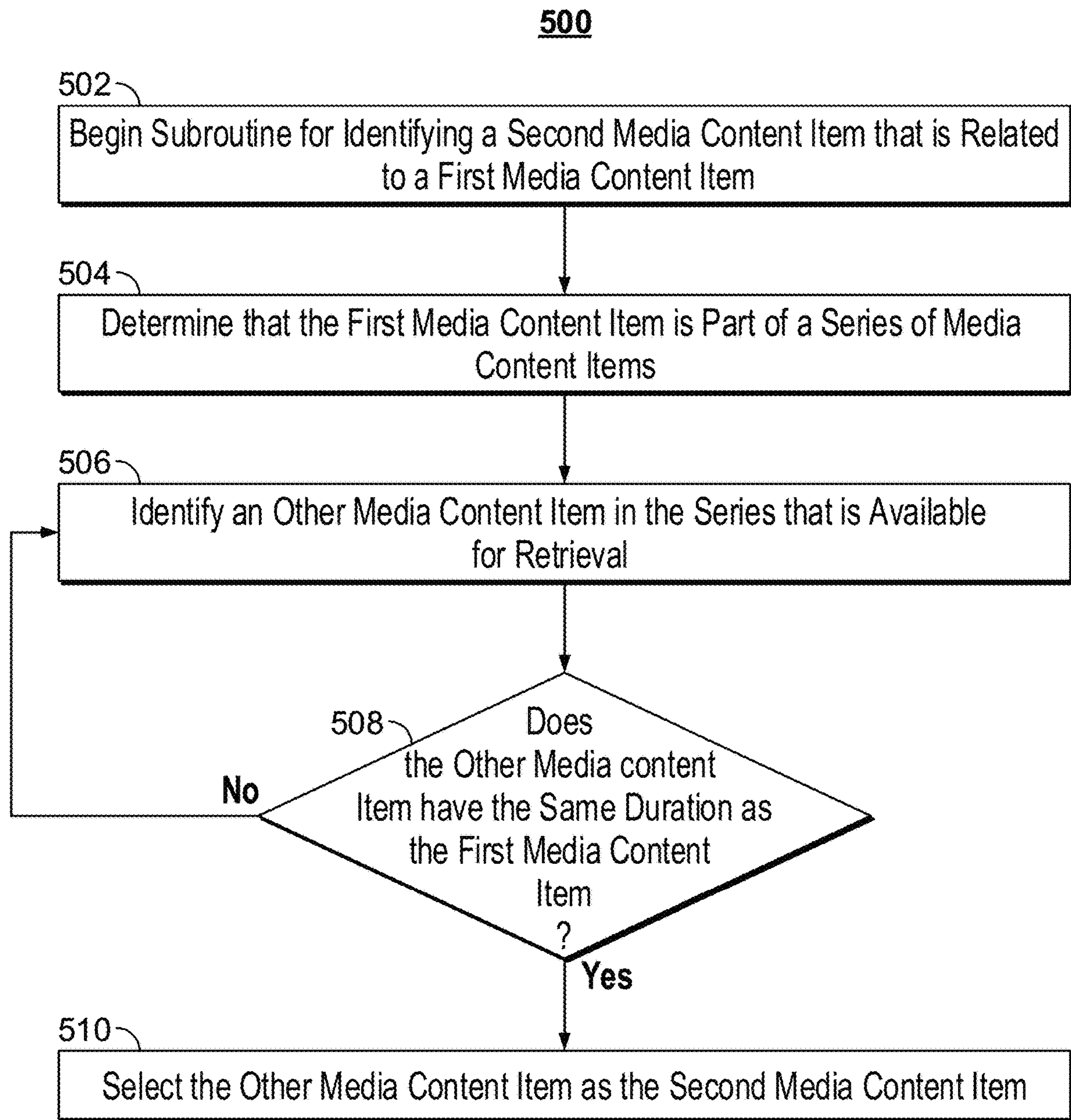


FIG. 5

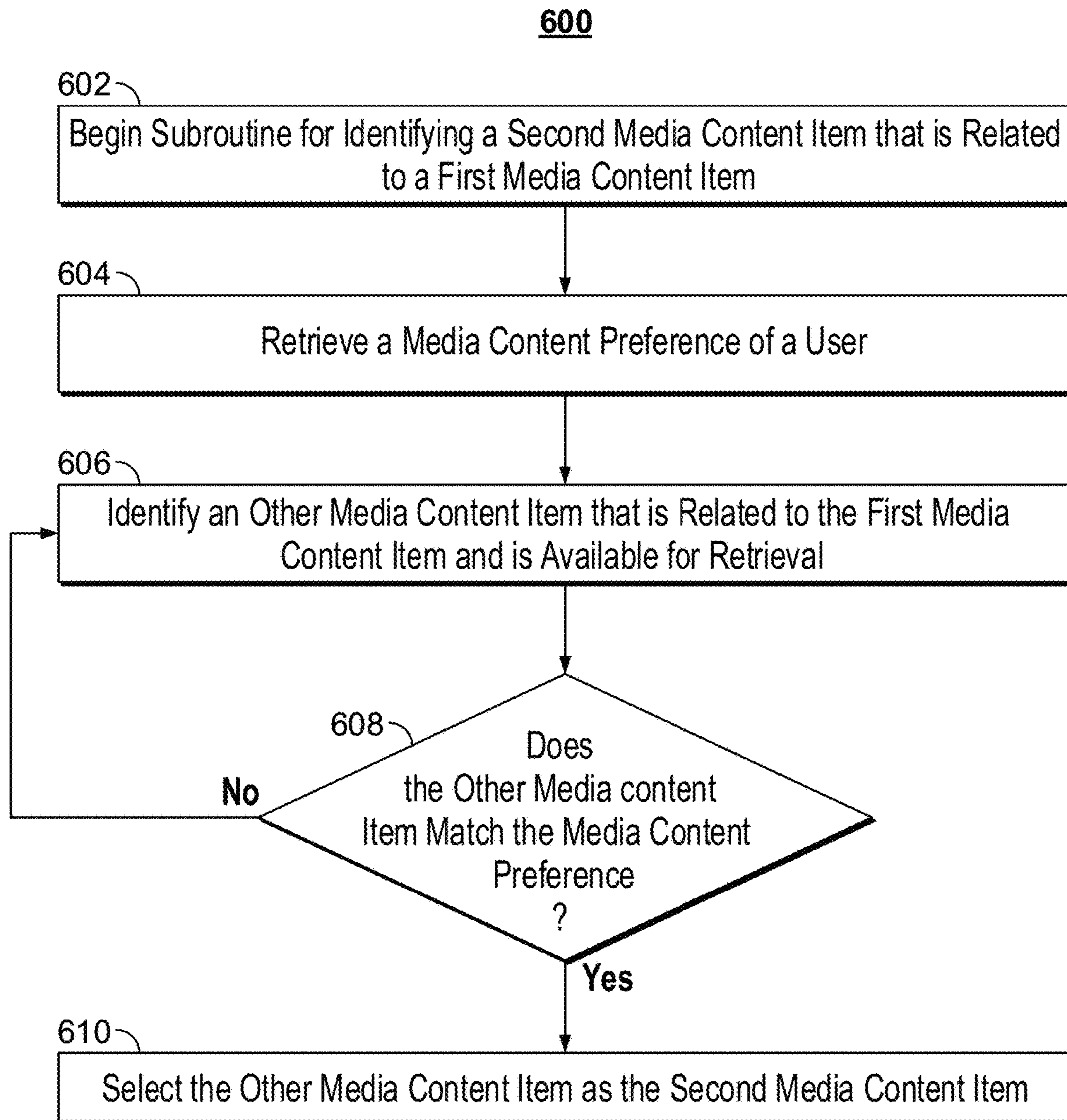


FIG. 6

1

PERSONALIZED MEDIA GUIDE FOR OFFLINE MEDIA DEVICES

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a continuation of U.S. patent application Ser. No. 16/399,753 (now allowed), filed on Apr. 30, 2019. The disclosure of each application is hereby incorporated by reference herein in its entirety.

BACKGROUND

The present disclosure relates to personalized media guides, and more particularly, to methods and systems for generating a personalized media guide for offline media devices.

SUMMARY

Media devices, such as smartphones, tablets, computers, etc., have become very popular for watching media content, and for some users, may even be the primary device on which they watch media content. Users have also become accustomed to having their media devices with them at all times and want their media devices to operate in the same manner regardless of where they are used. Advances in network technologies, such as high-speed wireless and cellular networks, have greatly reduced the amount of time that media devices are not connected to content distribution networks, but there are still some instances and situations where the media devices are offline.

While many users now prefer to watch media content on demand, or time shifted, a lot of media content items are still first distributed via linear content distribution channels. As a result, many users are still accustomed to viewing a channel-based media guide, such as an electronic program guide (EPG), to find media content to watch. Some examples of EPGs provide a list of channels available to the user along with a plurality of timeslots for each channel identifying the media content that will be distributed during those timeslots. While such EPGs are well suited for media devices that are connected to the content distribution network via a high-bandwidth (e.g., broadband) connection, these EPGs do not operate as well when the media devices are offline (e.g., disconnected or have a slow, low-bandwidth, or limited connection to the content distribution network), and are thus unable to receive the linear content distributions.

To overcome such problems, methods and systems are described herein for generating media guides for offline media devices. In particular, the embodiments described herein provide for retrieving media content guide data and media content available for retrieval in advance—e.g., while the media devices are connected to the content distribution network via a high-bandwidth connection. A media guide for the retrieved content is then generated for display when the media devices are offline.

In some embodiments, media content guide data are retrieved for a subset of channels preferred by a user. The methods and systems then identify one or more media content items, from the media content guide data for the channels preferred by the user, that are not available for retrieval in advance. To substitute for such media content items, the methods and systems then identify other media content items that are related to the unavailable media content items and that are available for retrieval in advance

2

and retrieve those other media content items. A media content guide interface is then generated for the subset of channels preferred by the user, and identifiers for the other media content items are displayed in timeslots for the unavailable media content items. The media content guide is thus personalized for the user and includes only content that is available for offline viewing on the media device.

The methods and systems described herein thus improve the user experience for offline media devices by displaying only content that is available for viewing and excluding any content that is not available. The methods and systems further provide for improved resource allocation due to retrieving only media content for channels preferred by the user, thereby reducing wasted network traffic and storage allocation for media content items the user will not want to watch.

BRIEF DESCRIPTION OF THE DRAWINGS

The above and other objects and advantages of the disclosure will be apparent upon consideration of the following detailed description, taken in conjunction with the accompanying drawings, in which like reference characters refer to like parts throughout, and in which:

FIG. 1 shows an illustrative scenario for generating a personalized media guide for offline media devices, in accordance with some embodiments of the disclosure;

FIG. 2 shows an illustrative system for generating a personalized media guide for offline media devices, in accordance with some embodiments of the disclosure;

FIG. 3 shows a diagram of illustrative devices of the system of FIG. 2, in accordance with some embodiments of the disclosure;

FIGS. 4A and B show a flowchart of an illustrative process for generating a personalized media guide for offline media devices, in accordance with some embodiments of the disclosure;

FIG. 5 is a flowchart of a detailed illustrative process for identifying a second media content item that is related to a first media content item, in accordance with some embodiments of the disclosure; and

FIG. 6 is a flowchart of another detailed illustrative process for identifying a second media content item that is related to a first media content item, in accordance with some embodiments of the disclosure.

DETAILED DESCRIPTION

FIG. 1 shows an illustrative scenario **100** for generating a personalized media guide for offline media devices. In FIG. 1, a media device **102** receives as input media content guide data **104**. The media content guide data **104** includes a plurality of identifiers for channels **114** and a plurality of timeslots **124**, each including a media content identifier **134** corresponding to a media content item that will be distributed during that timeslot **124**. The media device **102** then retrieves one or more media content items **116** corresponding to the media content identifiers **134** from a database **112** provided by a content source **106**. If a first media content item corresponding to one of the media content identifiers **134** is not available for retrieval from the content source **106**, the media device **102** identifies a second media content item **126** that is related to the first media content item that is not available for retrieval and retrieves the second media content item **126**. The media device **102** then generates for display a personalized media content guide **108** in which a

media content identifier **118** of the second media content item **126** is displayed in a timeslot of the first media content item.

The media device **102** may be any device on which media content guides can be displayed, such as a smartphone, a personal computer (PC), a laptop computer, a tablet computer, a handheld computer, a personal digital assistant (PDA), a smart television (TV), a streaming media device, a WebTV box, a personal computer television (PC/TV), a wearable computer, an automotive media system, and/or any other computing equipment on which media content guides can be displayed. As described further below, the media device **102** is configured to display a graphical user interface (GUI) that shows the personalized media content guide **108** and may further show the media content items **126**.

The media content guide data **104** may be any data from which a media content guide may be generated. For example, the media content guide data **104** may include electronic program guide (EPG) data usable for generating conventional EPGs. In some embodiments, the media content guide data **104** includes linear content distribution data—that is, data indicating the media content items that will be distributed by a particular channel **114** at a particular time. In other embodiments, the media content guide data **104** includes on-demand or streaming content availability data indicating media content items that are available from a particular channel **114** at any time, not necessarily limited to a particular time. The channels **114** may thus be linear distribution channels (e.g., broadcast television and/or live streaming channels) and/or on-demand distribution channels (e.g., on demand retrieval and/or streaming channels).

The content source **106** may be any server or other computing device from which media content items **116** and **126**, and/or metadata related to the media content items **116** and **126** may be retrieved. For example, the content source **106** may be a cloud storage platform by means of which media content items are collected, stored, and distributed, and from which a media device **102** may retrieve the media content items **116** and **126**. The media content items **116** and **126** may be any audio and/or video content distributed by a content source **106** and retrievable by the media device **102**. Examples of media content items **116** and **126** include television shows, web-TV shows, video shorts, movies, home videos, music and other audio recordings, etc.

FIG. 2 shows an illustrative system for generating a personalized media guide for offline media devices. In particular, FIG. 2 shows a system **200** where the media device **102** retrieves the media content items **116** and **126**, and/or the metadata related to the media content items **116** and **126** from the content source **106** via a communications path **232**. The communications path **232** may be any network or communication equipment or medium by means of which the media device **102** can communicate with (e.g., submit a query to and/or retrieve data or content from) the content source **106**. In one illustrative example, the communications path **232** includes devices connected via the Internet.

A media content guide-generating application may be implemented on any one or a combination of the media device **102**, the content source **106**, and/or an application server **220**, each of which may function as a stand-alone device or may be part of a network of devices. Various network configurations of devices may be implemented and are discussed in more detail below. In the system **200**, there may be multiple media devices **102**, but only one is shown in FIG. 2 to avoid overcomplicating the drawing. In addition, multiple users may each utilize more than one type of

media device **102** and also more than one of each type of media device **102**, as described above.

The media device **102** may be coupled to a communication network **230**. The communication network **230** may be one or more networks including the Internet, mobile phone network, mobile voice or data network (e.g., a 4G or LTE network), cable network, public switched telephone network, or other types of communication network or combinations of communication networks. The media device **102**, the content source **106**, and the application server **220** may be connected to the communication network **230** via one or more communications paths **232**, such as a satellite path, a fiber-optic path, a cable path, a path that supports Internet communications (e.g., IP), free-space connections (e.g., for wireless signals), and/or any other suitable wired or wireless communications path or combination of such paths.

Although communications paths **232** are not drawn directly between the media device **102** and the content source **106** or the application server **220**, these devices may communicate directly with each other via communications paths **232**, such as short-range point-to-point communications paths, for example USB cables, IEEE 1394 cables, wireless paths (e.g., BLUETOOTH, infrared, IEEE 802-11x, etc.), or other short-range communication via wired or wireless paths. BLUETOOTH is a certification mark owned by Bluetooth SIG, INC. The devices may also communicate with each other directly through an indirect path via the communication network **230**.

The system **200** may include more than one content source **106**, but only one is shown in FIG. 2 to avoid overcomplicating the drawing. As shown in FIG. 1, the content source **106** includes a database, table, or other data structure, (referred to hereinafter as database **212**) storing a list of each media content item **116** and **126** on the content source **106**, and/or data indicating other media content items to which each media content item **116** and **126** is related.

The media content guide-generating application may be, for example, a stand-alone application implemented on the media device **102** described above. For example, the media content guide-generating application may be implemented as software or a set of executable instructions, which may be stored in storage **308** (described below with reference to FIG. 3) and executed by control circuitry **304** (described below with reference to FIG. 3) of the media device **102**. In some embodiments, the media content guide-generating application is a client/server-based application where only a client application resides on the media device **102**, and a server application resides on the application server **220**. For example, a media content guide-generating application may be implemented partially as a client application on the control circuitry **304** of the media device **102** and partially on the application server **220** as a server application running on the control circuitry **304** of the application server **220**. When executed by the control circuitry **304** of the application server **220**, the media content guide-generating application may instruct the control circuitry **304** of the media device **102** to transmit the media content guide data and/or data regarding the second media content item **126** to the application server **220**, which then generates the personalized media content guide **108** and transmits the personalized media content guide **108** back to the media device **102**.

While system **200** is shown in FIG. 2 as including only the media device **102**, the content source **106**, and the application server **220**, those skilled in the art will appreciate that the system **200** may further include various other devices. In some embodiments, the media device **102** may operate in a cloud computing environment to access cloud services. In a

cloud computing environment, various types of computing services for content sharing, storage, or distribution are provided by a collection of network-accessible computing and storage resources, referred to as “the cloud.” The media device **102** may be a cloud client that relies on cloud computing for application delivery, or the media device **102** may have some functionality without access to cloud resources. For example, some applications running on the media device **102**, such as the media content guide-generating application, may be cloud applications, that is, applications delivered as a service over the Internet, while other applications may be stored and run on the media device **102**. In some embodiments, the media device **102** uses cloud resources for processing operations, such as the processing operations performed by the processing circuitry **306** described in relation to FIG. 3. For example, the media device **102** may rely on the application server **220** and/or another cloud resource to generate the personalized media content guide **108**.

FIG. 3 shows a generalized embodiment of an illustrative media device **300**. As depicted, the media device **300** may be a smartphone or tablet. The media device **300** may receive content and data via an input/output (hereinafter “I/O”) path **302**. The I/O path **302** may provide user input, user preferences, the media content guide data **104**, the media content items **116** and **126**, and/or metadata related to any of the aforementioned to control circuitry **304**, which includes processing circuitry **306** and storage **308**. The control circuitry **304** may send and receive commands, requests, and other suitable data using the I/O path **302**. The I/O path **302** may connect the control circuitry **304** (and specifically the processing circuitry **306**) to one or more communications paths (described below). I/O functions may be provided by one or more of these communications paths, but a single path is shown in FIG. 3 to avoid overcomplicating the drawing.

The control circuitry **304** may be based on any suitable processing circuitry, such as the processing circuitry **306**. As referred to herein, processing circuitry should be understood to mean circuitry based on one or more microprocessors, microcontrollers, digital signal processors, programmable logic devices, field-programmable gate arrays (FPGAs), application-specific integrated circuits (ASICs), etc., and may include a multi-core processor (e.g., dual-core, quad-core, hexa-core, octa-core, or any suitable number of cores). In some embodiments, processing circuitry is distributed across multiple separate processors or processing units, for example, multiple of the same type of processing units (e.g., two INTEL CORE i7 processors) or multiple different processors (e.g., an INTEL CORE i5 processor and an INTEL CORE i7 processor). In some embodiments, the control circuitry **304** executes instructions for a media content guide-generating application stored in memory (i.e., the storage **308**). Specifically, the control circuitry **304** may be instructed by the media content guide-generating application to identify the second media content item **126** that is related to the first media content item, generate the media content guide, and/or perform the other functions described above and below.

In client/server-based embodiments, the control circuitry **304** includes communications circuitry suitable for communicating with a media content guide-generating application server or other networks or servers. The instructions for carrying out the above-mentioned functionality may be stored on a server. Communications circuitry may include a cable modem, an integrated services digital network (ISDN) modem, a digital subscriber line (DSL) modem, a telephone

modem, an Ethernet card, or a wireless modem for communications with other equipment, or any other suitable communications circuitry. Such communications may involve the Internet or any other suitable communication networks or paths. In addition, the communications circuitry may include circuitry that enables peer-to-peer communication of media devices, or communication of media devices in locations remote from each other.

The memory may be an electronic storage device provided as the storage **308** that is part of the control circuitry **304**. As referred to herein, the phrase “electronic storage device” or “storage device” should be understood to mean any device for storing electronic data, computer software, or firmware, such as random-access memory, hard drives, optical drives, solid state devices, quantum storage devices, or any other suitable fixed or removable storage devices, and/or any combination of the same. Nonvolatile memory may also be used. Cloud-based storage, described in relation to FIG. 2, may be used to supplement the storage **308** or instead of the storage **308**.

The circuitry described herein may execute instructions included in software running on one or more general purpose or specialized processors. Multiple circuits may be provided to handle simultaneous processing functions. If the storage **308** is provided as a separate device from the media device **300**, the circuitry may be associated with the storage **308**.

A user may send instructions to the control circuitry **304** using a user input interface **310** of the media device **300**. The user input interface **310** may be any suitable user interface, such as a remote control, mouse, trackball, keypad, keyboard, touchscreen, touchpad, stylus input, joystick, or other user input interfaces. Display **312** may be a touchscreen or touch-sensitive display. In such circumstances, user input interface **310** may be integrated with or combined with the display **312**. A camera, microphone, or other visual or voice recognition interface may also be used to receive user input. Speakers **314** may be provided as integrated with other elements of the media device **300**.

The media content guide-generating application may be implemented using any suitable architecture. For example, it may be a stand-alone application wholly implemented on the media device **300**. The media content guide-generating application and/or any instructions for performing any of the embodiments discussed herein may be encoded on computer-readable media. Computer-readable media include any media capable of having computer-executable instructions encoded thereon that, when executed by a processor, cause a device, such as media device **300**, to perform the instructed operations. In some embodiments, the media content guide-generating application is a client/server-based application. Data for use by a thick or thin client implemented on the media device **300** are retrieved on demand by issuing requests to a server remote from the media device **300**, as described above. Those skilled in the art will appreciate that the media device **102** of FIG. 1 may be implemented as the media device **300** of FIG. 3.

FIG. 4 is a flowchart of an illustrative process for generating a personalized media guide for offline media devices, in accordance with some embodiments of the disclosure. A process **400** for generating a personalized media guide for offline media devices may begin at block **402**, where control circuitry, such as the control circuitry **304**, retrieves media content guide data, such as the media content guide data **104**, for a plurality of channels **114**. For example, the control circuitry **304** of the media device **102** may retrieve the media content guide data **104** from a content source, such as the

content source 106, or another provider of media content guide data. In some embodiments, the media content guide data indicates, for each of the plurality of channels 114, the media content items 116 that will be distributed by each respective channel 114 during a plurality of timeslots 124. In some embodiments, the media content guide data 104 includes data for multiple days or even weeks, but the control circuitry 304 retrieves media content guide data for merely a subset of that period, for example, only one or two days.

At block 404, the control circuitry 304 determines whether any of the plurality of channels 114 do not make media content items 116 distributed by such channels available for retrieval. For example, some channels 114 may make media content items 116 distributed by such channels available only via linear distribution (e.g., live distribution during a predetermined time). Other channels 114 may also make media content items 116 distributed by such channels available via streaming. Both of these example channels 114, however, do not make the media content items 116 they distribute available for retrieval. In response to determining that one or more of the plurality of channels 114 do not make media content items 116 distributed by such channels available for retrieval, the process 400 proceeds to block 406. In response to determining that none of the plurality of channels 114 do not, and thus all of the plurality of channels do, make the media content items 116 distributed by the channels 114 available for retrieval, the process skips ahead to block 408.

At block 406, the control circuitry 304 excludes the channels 114 determined at block 404 to not make media content items 116 available for retrieval from the plurality of channels 114. For example, the control circuitry 304 may generate a list of the channels 114 included in the plurality of channels 114 for which media content guide data 104 was retrieved at block 402 and may remove from the list any channels 114 determined at block 404 to not make media content items 116 available for retrieval.

At block 408, the control circuitry 304 identifies a subset of the plurality of channels 114 that are preferred by a user. For example, the control circuitry 304 may retrieve, from a user profile of the user, a viewing history indicating a group of channels 114 that are viewed regularly by the user. In some embodiments, the control circuitry 304 may determine that a channel that is viewed at least once every seven days is a channel that the user views regularly. In other embodiments, the control circuitry 304 may determine that a channel that is viewed at least three times every seven days is a channel that the user views regularly. Those skilled in the art will appreciate that these examples of regularity are merely illustrative, and that other intervals or thresholds may be substituted for these examples without departing from the scope of the present disclosure. The control circuitry 304 may then select, from the group of channels 114 that are viewed regularly by the user, those channels 114 that make media content 134 available for retrieval as the subset of the plurality of channels 114 that are preferred by the user.

At block 410, the control circuitry 304 determines whether any media content items 116 that will be distributed by the plurality of channels 114 in the subset are not available for retrieval. For example, the control circuitry 304 may determine whether a first media content item 116, that is indicated in the media content guide data 104 as scheduled for distribution by one of the channels 114 in the subset identified at block 408, is not available for retrieval from the content source 106. In response to determining that none of the media content items 116 that will be distributed by the

plurality of channels 114 in the subset are not available, and thus all of the media content items 116 are available, for retrieval, the process 400 ends. In response to determining that the first media content item 116 is not available for retrieval, the process 400 proceeds to block 412.

At block 412, the control circuitry 304 identifies a second media content item 126 that is related to the first media content item and is available for retrieval. For example, the control circuitry 304 may identify a second media content item 126 that has the same genre, plot, director, starring cast member, and/or is from the same series of media content items as the first media content item. The process for identifying the second media content item 126 is further described below with reference to FIGS. 5 and 6.

At block 414, the control circuitry 304 retrieves the second media content item 126 identified at block 412. For example, the control circuitry 304 may download the second media content item 126 from the content source 106, store a stream of the second media content item 126 received from the content source 106, and/or load a previously downloaded or stored copy of the media content item 126 from the memory 308. In other words, in some embodiments, the second media content item 126 has previously been retrieved from the content source 106 and is thus already stored in the memory 308. In such embodiments, the control circuitry 304 determines whether the second media content item 126 is stored in the memory 308, and in response to determining that the second media content item 126 is stored in the memory 308, the control circuitry 304 does not again retrieve the second media content item 126 from the content source 106.

At block 416, the control circuitry 304 retrieves a plurality of media content items 116 that will be distributed by the channels 114 in the subset. For example, the control circuitry 304 may identify, from the plurality of media content items 116 that the media content guide data 104 indicates will be distributed by the channels 114 in the subset of the plurality of channels 114 preferred by the user, such media content items 116 that are available for retrieval from the content source 106, and send a request to the content source 106 to retrieve such media content items 116 from the database 112. In some embodiments, the control circuitry 304 may first determine which of the plurality of media content items 116 that will be distributed by the channels 114 in the subset are currently stored on the media device 102 (e.g., in the storage 308), and exclude such media content items 116 when determining which media content items 116 to retrieve since those media content items 116 are already stored on the media device 102.

At block 418, the control circuitry 304 retrieves a media content preference of the user. For example, the control circuitry 304 may retrieve, from the user profile of the user, a media content preference of the user—e.g., a particular genre, character, starring cast member, media content series or franchise, director or other production member, etc.

At block 420, the control circuitry 304 identifies a plurality of media content items 116 matching the media content preference of the user, as retrieved at block 418. For example, the control circuitry 304 may retrieve metadata associated with the media content items 116 and parse the metadata to determine if the metadata describe the media content preference of the user.

At block 422, the control circuitry 304 determines whether any of the plurality of media content items 116 that were determined to match the media content preference of the user at block 420 are not stored on the media device 102, and thus need to be retrieved. In some embodiments, the

control circuitry 304 selects a subset of the plurality of media content items 116 matching the media content preference of the user for inclusion in a personalized channel and determines whether the selected subset of media content items 116 are currently stored on the media device 102. In response to determining that one or more of the media content items 116 in the plurality of media content items 116 are not currently stored on the media device 102, the process 400 proceeds to block 424. In response to determining that all of the media content items 116 in the plurality of media content items 116 are already stored on the media device 102, the process 400 skips ahead to block 426.

At block 424, the control circuitry 304 retrieves the media content items 116 identified at block 422 as not currently being stored on the media device 102. For example, the control circuitry 304 may download the media content items 116 identified at block 422 from the content source 106, store a stream of the media content items 116 identified at block 422 received from the content source 106, and/or load previously downloaded or stored copies of the media content items 116 identified at block 422 from the memory 308. Thus, similar to the retrieval of the second media content item 126 described above with reference to block 414, in some embodiments, the media content items 116 identified at block 422 were previously retrieved from the content source 106 and are thus already stored in the memory 308. In such embodiments, the control circuitry 304 determines whether the media content items 116 identified at block 422 are stored in the memory 308, and in response to determining that the media content items 116 identified at block 422 are stored in the memory 308, the control circuitry 304 does not again retrieve the media content items 116 identified at block 422 from the content source 106.

At block 426, the control circuitry 304 generates for display a media content guide interface 108 in which a media content identifier 118 for the second media content item 126, as identified at block 412, is displayed in a timeslot 124 for the first media content item 116 that was determined to be unavailable for retrieval at block 410. The media content guide interface 108 may include identifiers for media content items that were retrieved from the content source 106 at blocks 416 and 424, as well as identifiers for media content items that were previously retrieved and thus already stored in the memory 308. In some embodiments, the control circuitry 304 replaces an identifier for the first media content item 116 with the identifier 118 for the second media content item 126 and generates for display only the identifier 118 for the second media content item 126 in the timeslot of the first media content item 116. In other embodiments, the control circuitry 304 generates for display both the identifier for the first media content item 116 and the identifier 118 for the second media content item 126 in the timeslot for the first media content item 116. In such embodiments, the control circuitry 304 may generate for display the identifier for the first media content item 116 in such a manner that indicates that the first media content item 116 has been replaced by the second media content item 126. For example, the identifier for the first media content item may be greyed-out, dimmed, struck through, highlighted in a different color, etc. The control circuitry 304 may further generate for display an indication that the second media content item 126 is provided in place of the first media content item 116. For example, the control circuitry 304 may generate for display a visual indicator or mark indicating that the second media content item 126 is replacing the first media content item 116. The control circuitry 304 may further generate for display identifiers for media content

items 116 that are available for retrieval in timeslots corresponding to those media content items 116. In some embodiments, the control circuitry 304 may generate for display the media content guide interface 108 at a time when the media device 108 is not connected to the content source 106, and thus not able to receive live distributions or streaming of the media content items 116. For example, the control circuitry 304 may determine whether the media device 102 has a high-bandwidth connection to the content source 106, and if the media device 102 does not, generate for display the media content guide interface 108.

At block 428, the control circuitry 304 generates for display a personalized channel with a channel identifier matching the media content preference of the user, and identifiers of the plurality of media content items 116 matching the user preference, as identified at block 420, in timeslots of the personalized channel. For example, the control circuitry 304 may generate for display a personalized channel of media content items 116 matching the user preference. The channel identifier for the personalized channel may correspond to the media content preference (e.g., a particular media content series or franchise, character, etc.) and the control circuitry 304 may fill the timeslots for the personalized channel with identifiers for the media content items 116 preferred by the user, as identified at block 420.

FIG. 5 is a flowchart of a detailed illustrative process for identifying a second media content item that is related to a first media content item, in accordance with some embodiments of the disclosure. A process 500 for identifying a second media content item that is related to a first media content item may begin at block 502. At block 504, the control circuitry 304 determines that the first media content item is part of a media content series or franchise. For example, the control circuitry 304 may retrieve metadata associated with the first media content item and determine, based on the metadata, that the first media content item is part of the media content series or franchise.

At block 506, the control circuitry 304 identifies an other media content item in the media content series or franchise that is available for retrieval. For example, the control circuitry 304 may query the database 112 for media content items 126 that are part of the media content series or franchise identified at block 504.

At block 508, the control circuitry 304 determines whether the other media content item identified at block 506 has the same duration as the first media content item 116. For example, the control circuitry 304 may compare the duration of the first media content item 116 with the duration of the other media content item identified at block 506. In response to determining that the duration of the first media content item 116 and the other media content item identified at block 506 are not the same, the process 500 returns to block 506 where the control circuitry 304 identifies another media content item in the media content series or franchise. In response to determining that the first media content item 116 and the other media content item identified at block 506 have the same duration, the process 500 proceeds to block 510. In some embodiments, the control circuitry 304 selects multiple other media content items to replace the first media content item 116. For example, if the first media content item 116 has a duration that is longer than the other media content items identified at block 506, the control circuitry 304 may select multiple other media content items to fill the duration of the first media content item 116. In such embodiments, the control circuitry 304 may use various algorithms to select the other media content items to fill the duration of the first media content item 116. An example of such algorithms is

11

the 0–1 knapsack algorithm, which is an optimization solution that maximizes the value of a collection of assets drawn from a larger set, where each asset has a “weight” and “value,” and each asset must be taken in whole (as opposed to the fractional-knapsack algorithm where you can select a portion of an asset if needed). The collection of selected assets must fit into a given size container. This algorithm draws from a set of solutions that display an optimal substructure, where the solution for a knapsack of size W draws from an optimal solution for $W-w_i$, and can thus be solved by dynamic programming. Specifically, to consider an item for inclusion, the algorithm must compare the solution to the subproblem where the item is included versus the subproblem where the item is excluded before determining if the item should be included in the optimal solution.

To map the 0–1 knapsack algorithm to the problem of selecting other media content items to fill the duration of the first media content item **116**, each item for consideration is simply a media content item stored in the storage **308** of the media device **102** that matches any predefined content restriction rules (e.g., must be part of the same media content series or franchise). Since the size of the knapsack, W , would be the duration of the first media content item **116**, the “weight” of each item, w_i , would be its duration. The “value” of the item, v_i , would be a relevancy score of the other media content item to the first media content item **116**. For example, an other media content item that is the immediately preceding or subsequent installment in the media content series or franchise will have a higher relevancy score than other media content items that are further removed in the media content series or franchise from the first media content item **116**. Thus, the 0–1 knapsack will attempt to find the maximum $\sum v_i$ such that their corresponding $\sum w_i \leq W$.

In some embodiments, the top-scoring/highest-valued other media content item has a duration that is shorter than the duration of the first media content item **116**, and thus the algorithm will attempt to fill the remainder of the duration of the first media content item **116** with a second other media content item. Thus, in some embodiments, the control circuitry **304** may fill the duration of the first media content item **116** with multiple other media content items that have a higher relevancy score, and that together fill the duration of the first media content item **116**.

At block **510**, the control circuitry **304** selects the other media content item identified at block **506** as the second media content item **126**.

FIG. **6** is a flowchart of another detailed illustrative process for identifying a second media content item **126** that is related to a first media content item **116**, in accordance with some embodiments of the disclosure. A process **600** for identifying a second media content item **126** that is related to a first media content item **116** may begin at block **602**. At block **604**, the control circuitry **304** retrieves a media content preference of the user. For example, the control circuitry **304** may retrieve, from the user profile of the user, a media content preference of the user—e.g., a particular genre, character, starring cast member, media content series or franchise, director or other production member, etc.

At block **606**, the control circuitry **304** identifies an other media content item that is related to the first media content item **116** and is available for retrieval. For example, the control circuitry **304** may identify an other that has the same genre, plot, director, starring cast member, and/or is from the same series of media content items as the first media content item, and query the database **112** to determine if the other media content item is available for retrieval.

12

At block **608**, the control circuitry **304** determines whether the other media content item identified at block **606** matches the media content preference of the user retrieved at block **604**. For example, the control circuitry **304** may retrieve metadata of the other content item identified at block **606** and parse the metadata to determine if the metadata describes the media content preference of the user. In response to determining that the other media content item identified at block **606** does not match the media content preference of the user, the process **600** returns to block **606** where the control circuitry **304** selects another media content item that is related to the first media content item **116** and is available for retrieval. In response to determining that the other media content item identified at block **606** matches the media content preference of the user, the process **600** proceeds to block **610**.

At block **610**, the control circuitry **304** selects the other media content item identified at block **606** as the second media content item **126**.

It will be apparent to those of ordinary skill in the art that methods involved in the present invention may be embodied in a computer program product that includes a computer-usable and/or -readable medium. For example, such a computer-usable medium may consist of a read-only memory device, such as a CD-ROM disk or conventional ROM device, or a random-access memory, such as a hard drive device or a computer diskette, having a computer-readable program code stored thereon. It should also be understood that methods, techniques, and processes involved in the present disclosure may be executed using processing circuitry.

The processes discussed above are intended to be illustrative and not limiting. More generally, the above disclosure is meant to be exemplary and not limiting. Only the claims that follow are meant to set bounds as to what the present invention includes. Furthermore, it should be noted that the features and limitations described in any one embodiment may be applied to any other embodiment herein, and flowcharts or examples relating to one embodiment may be combined with any other embodiment in a suitable manner, done in different orders, or done in parallel. In addition, the systems and methods described herein may be performed in real time. It should also be noted, the systems and/or methods described above may be applied to, or used in accordance with, other systems and/or methods.

What is claimed is:

1. A method comprising:

- retrieving metadata associated with a first media item; based on the metadata, determining that the first media item (a) is available for online viewing on a device while the device is communicatively coupled to a content source and (b) is unavailable for offline viewing on the device while the device is not communicatively coupled to the content source;
- identifying a plurality of media items that are available for retrieval while the device is not communicatively coupled to the content source;
- comparing a first duration of the first media item to a second duration of a second media item of the plurality of media items; and
- in response to determining that the second duration of the second media item is similar to the first duration of the first media item:
 - selecting the second media item for offline viewing;
 - and

13

generating the second media item for display on the device instead of generating the first media item for display.

2. The method of claim 1, further comprising:
determining that the first media item is part of a series of media items; and
querying a database of media items for the series of media items.

3. The method of claim 2, further comprising:
in response to determining that the second duration of the second media item is not similar to the first duration of the first media item:
identifying a third media item in the series of media items that is different from the second media item.

4. The method of claim 2, further comprising:
identifying a fourth media item and a fifth media item in the series of media items;
determining, by using 0-1 knapsack algorithm, that the fourth media item has a higher relevance score than the fifth media item, wherein the fourth media item is an immediately preceding or subsequent installment in the series of media items to the first media item, than the fifth media item;
generating for display the fourth media item on the device; and
generating for display the fifth media item subsequent to generating for display the fourth media item on the device.

5. The method of claim 1, further comprising:
in response to determining that the second duration of the second media item is shorter than the first duration of the first media item:
identifying a sixth media item from the plurality of media items;
retrieving metadata associated with the sixth media item;
determining that the sixth media item is part of a series of media items based on the retrieved metadata associated with the sixth media item; and
generating the second media item and the sixth media item for display on the device instead of generating the first media item for display.

6. The method of claim 1, wherein generating the second media item for display comprises generating for display an identifier of the second media item in a timeslot for the first media item in a media guide.

7. The method of claim 1, further comprising:
retrieving, from user data, a media content preference of a user;
wherein selecting the second media item is based on the media content preference.

8. The method of claim 1, further comprising:
generating for display a media content guide interface that includes identifiers for media items that are available for offline viewing and excludes identifiers for media items that are unavailable for offline viewing on the device while the device is not communicatively coupled to the content source.

9. The method of claim 1, further comprising:
retrieving media guide data for a plurality of channels, wherein the media guide data indicates, for each of the plurality of channels, media items that will be distributed by each respective channel during a plurality of timeslots;
wherein the first media item has a respective timeslot of the plurality of timeslots.

14

10. The method of claim 1, wherein the second media item has at least one of the same genre, plot, director, or starring cast member as the first media item.

11. A system comprising:
control circuitry configured to:
retrieve metadata associated with a first media item;
based on the metadata, determine that the first media item (a) is available for online viewing on a device while the device is communicatively coupled to a content source and (b) is unavailable for offline viewing on the device while the device is not communicatively coupled to the content source;
identify a plurality of media items that are available for retrieval while the device is not communicatively coupled to the content source;
compare a first duration of the first media item to a second duration of a second media item of the plurality of media items; and
in response to determining that the second duration of the second media item is similar to the first duration of the first media item:
select the second media item for offline viewing; and
generate the second media item for display on the device instead of generating the first media item for display.

12. The system of claim 11, wherein the control circuitry is further configured to:
determine that the first media item is part of a series of media items; and
query a database of media items for the series of media items.

13. The system of claim 12, wherein the control circuitry is further configured to:
in response to determining that the second duration of the second media item is not similar to the first duration of the first media item:
identify a third media item in the series of media items different from the second media item.

14. The system of claim 12, wherein the control circuitry is further configured to:
identify a fourth media item and a fifth media item in the series of media items;
determine, by using 0-1 knapsack algorithm, that the fourth media item has a higher relevance score than the fifth media item, wherein the fourth media item is an immediately preceding or subsequent installment in the series of media items, to the first media item than the fifth media item;
generate for display the fourth media item on the device; and
generate for display the fifth media item subsequent to generating for display the fourth media item on the device.

15. The system of claim 11, wherein the control circuitry is further configured to:
in response to determining that the second duration of the second media item is shorter than the first duration of the first media item:
identify a sixth media item from the plurality of media items;
retrieve metadata associated with the sixth media item;
determine that the sixth media item is part of a series of the media items based on the retrieved metadata associated with the sixth media item; and
generate the second media item and the sixth media item for display on the device instead of generating the first media item for display.

16. The system of claim 11, wherein generating the second media item for display comprises generating for display an identifier of the second media item in a timeslot for the first media item in a media guide.

17. The system of claim 11, wherein the control circuitry is further configured to:

retrieve, from user data, a media content preference of a user;

wherein selecting the second media item is based on the media content preference.

18. The system of claim 11, wherein the control circuitry is further configured to:

generate for display a media content guide interface that includes identifiers for media items that are available for offline viewing and excludes identifiers for media items that are unavailable for offline viewing on the device while the device is not communicatively coupled to the content source.

19. The system of claim 11, wherein the control circuitry is further configured to:

retrieve media guide data for a plurality of channels, wherein the media guide data indicates, for each of the plurality of channels, media items that will be distributed by each respective channel during a plurality of timeslots;

wherein the first media item has a respective timeslot of the plurality of timeslots.

20. The system of claim 11, wherein the second media item has at least one of the same genre, plot, director, or starring cast member as the first media item.

* * * * *